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BACTERAEMIA FOLLOWING GENITO-URINARY PROCEDURES*

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In recent years interest has been revived in the importance of bacteraemia following various genito-urinary procedures. Although often causing no symptoms or only a rigor, this may occasionally result in prolonged septicaemia, bacteraemic shock which is often rapidly fatal (*British Medical Journal*, 1964), or bacterial endocarditis (Merritt, 1951; Finn and Kane, 1952; Geraci and Martin, 1954; Lloyd-Still, 1965). The organisms involved in these serious complications, notably enterococci and Gram-negative bacilli, often pose difficult problems in therapy.

Many patients with urethral stricture undergo regular dilatation at the Whitechapel Clinic; prostatic massage and anterior urethroscopy are performed in all cases after an attack of urethritis. The incidence of bacteraemia after these procedures was investigated in a series of cases.

Material and Methods

Blood cultures were taken from 37 patients after 53 dilatations of strictures of the anterior urethra; fifteen of them had shown evidence of urinary infection in a mid-stream specimen taken just before the dilatation. These patients all had long-standing strictures and were attending for regular dilatation. Three to six gum-elastic bougies of increasing size were passed or in some cases curved metal sounds. Blood cultures were taken from 39 patients after 41 prostatic massages and from 22 patients after anterior urethroscopy, with air insufflation. Most of these patients had recently been treated for gonorrhoea or non-specific urethritis. Fifteen of the patients undergoing prostatic massage had clumps of leucocytes in the prostatic fluid. No local anaesthetic was used for dilatation or urethroscopy, nor was any attempt made to disinfect the urethra before the procedure. A paste containing 0·2 per cent. mercuric oxycyanide was used as a lubricant. A blood culture was taken as a control just before the procedure and another within 5 minutes. Each sample was inoculated into two bottles of glucose broth and one bottle of Brewer's medium. *Staphyloccus saprophyticus* was grown in a few cases but was considered to be a contaminant because in each instance it either appeared in a control culture also or grew in only one of the three bottles.

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Results

As shown in Table I, only one patient showed a positive blood culture after dilatation of a urethral stricture.

TABLE I

INCIDENCE OF POSITIVE BLOOD CULTURES

Procedure	No. of Patients	Positive Blood Cultures
Dilatation of Stricture (53) ..	37	1
Prostatic Massage (41) ..	39	0
Anterior Urethroscopy ..	22	0

Case History

A 41-year-old West African had a long-standing stricture of the proximal penile urethra which required dilatation at monthly intervals. The results of blood cultures taken after six consecutive dilatations over a period of 5 months are shown in Table II. All the control specimens taken before dilatation were sterile.

TABLE II

CULTURES OF BLOOD AND URINE AFTER SIX MONTHLY DILATATIONS IN ONE PATIENT WITH STRICTURE

Blood Culture (min. after dilatation)		Urine Culture
3–5	20	
Proteus	Not done	*Proteus*
Proteus and *Strep. faecalis*	Not done	*Proteus*
Proteus	Sterile	*E. coli*
Proteus	Sterile	*Proteus*
Sterile	Sterile	Sterile
Strep. faecalis	Not done	*Strep. faecalis*

When positive blood cultures were obtained the organisms grew in all three bottles. In four of the five instances where the blood cultures were positive the same organisms were grown from the urine. In the fifth series of cultures, dilatation was performed two days after completion of a course of ampicillin lasting 2 weeks, which temporarily rendered the urine sterile. When present, the bacteraemia was transient, as can be seen from the results of cultures taken 20 minutes after dilatation. This patient has never experienced a rigor after dilatation.

Discussion

It has long been known that dilatation of urethral strictures may result in serious consequences. Moffait in 1810 (see Clark, 1883) described the case of a patient with chronic stricture of the urethra in which instrumentation was followed by rigors, fever, purulent arthritis, and death. Brodie (1832) stressed that rigors were induced in many instances by the passage of bougies. He stated that they nearly always took place soon after the patient had passed urine and seemed to arise, not as the immediate effect of the operation, but in consequence of the urine flowing over that part which the bougie had dilated. He described a patient who experienced a rigor after each dilatation although there was no difficulty in passing the bougies. Hallé (1887) reported finding an organism in the blood of a patient with urethral stricture and partial retention of urine, who had a rigor after a rather traumatic passage of a bougie; the patient died 6 days later. However, in this case, the blood for culture was taken several hours after death. Bertelsmann and Mau (1902) described the case of a man who developed a rigor after each of two dilatations of a urethral stricture and who subsequently died of staphylococcal endocarditis.

Since these early reports, several other series of cases of bacteraemic shock and bacterial endocarditis or other serious complications of genito-urinary procedures have been published. There have, however, been comparatively few reports where systematic study was made to discover the incidence of bacteraemia following genito-urinary procedures (Table III). Barrington and Wright (1930) found bacteraemia within 6 minutes of operations on the urethra, or after dilatation some days later, in twelve out of twenty cases. It also occurred in one out of three cases following simple dilatation of a stricture. Positive blood cultures were in addition obtained from two of eleven patients soon after micturition following dilatation. Positive cultures were obtained only when the urine was heavily infected with the same organism, except in one case. A rigor occurred in only one patient with a positive blood culture, but a second culture taken at the time of the rigor was sterile. Nevertheless these workers thought that the occurrence of fever and rigors probably depended on the size of the bacterial invasion. They were more likely to occur after rough than gentle instrumentation.

Powers (1936) obtained positive blood cultures immediately after dilatation of urethral strictures in three out of sixteen cases, but he was uncertain whether the organisms were contaminants or not.

TABLE III

INCIDENCE OF BACTERAEMIA IMMEDIATELY AFTER VARIOUS GENITO-URINARY PROCEDURES

Authors	Date	Procedure		No. of Patients	Positive Blood Cultures
Barrington and Wright	1930	Operation on urethra or later dilatation		20	12
		Simple dilatation of stricture		3	1
Powers	1936	Dilatation of stricture		16	3
Biorn, cited by Merritt	1951	Trans-urethral resection of prostate		106	13
Slade	1958	Removal of catheter		38 with infected urine 12 with sterile urine	10 None
Mitchell and others	1962	Dilatation of stricture	No prior urethral disinfection	28 with infected urine	11
			Prior urethral disinfection	30 with infected urine	3
				86 with sterile urine	None
Tulloch and others	1964	Dilatation of stricture		14 with infected urine	5
Rodin and Murray	1966	Dilatation of stricture		15 with infected urine 22 with sterile urine	1 None
		Prostatic massage		39 (15 with chronic prostatitis)	None
		Anterior urethroscopy		22	None

Biorn (quoted by Merritt, 1951) took blood cultures at the end of trans-urethral resection of the prostate in 106 cases, thirteen (12 per cent.) of which were positive. Results of cultures were negative in all cases 48 hours after operation. Slade (1958) obtained ten positive cultures 2 to 10 minutes after catheters were removed from 38 patients with infected urine. In seven of these cases the organisms in the blood and urine were identical. In three of the cases in which cultures had been positive the tests were repeated after 15 minutes and the cultures were then sterile. No positive cultures were obtained from twelve patients with sterile urine at the time of removal of catheters. He also obtained two positive blood cultures after urethral instrumentation of eight patients with infected urine. The organisms in blood and urine were the same. Miller, Gillespie, Linton, Slade, and Mitchell (1958) obtained similar results after the removal of in-dwelling catheters inserted after operations on the prostate. Positive blood cultures were found particularly among patients who developed post-operative urinary infections or who were found to harbour bacteria different from those present before operation.

Mitchell, Slade, and Linton (1962) found fewer positive blood cultures following dilatation of strictures when this was performed after disinfection of the urethra with a jelly containing 0·1 per cent. chlorhexidine. Three of thirty patients with infected urine treated in this way produced positive cultures compared with eleven of 28 with infected urine who did not undergo prior urethral disinfection. In every case with a positive blood culture an apparently identical organism was found in the urine. Positive blood cultures were obtained 5 minutes after the first micturition after dilatation from three of 23 patients who received urethral disinfection and from nine of twelve who did not. Tulloch, Wilson, and King (1964) found organisms identical with those in the urine in the blood of three out of fourteen patients with urinary infection, 5 minutes after dilatation of strictures. Cultures taken 20 minutes after dilatation were negative in each case. Positive blood cultures were obtained in two other cases, but different organisms were grown from the urine.

Differences in the incidence of positive cultures after dilatation of strictures may be due to various factors, such as the severity of existing urinary infection, the degree of stricture, and the extent to which dilatation is attempted. When a local anaesthetic is used, as in the study of Mitchell and others (1962), it is possible that more and larger bougies will be passed than when no anaesthetic is used and so perhaps greater trauma is produced. However, there is no doubt that bacteraemia may follow gentle dilatation performed without difficulty and presumably with minimal trauma. Patients with sterile urine at the time of dilatation rarely seem to develop bacteraemia, and dilatation should, if possible, be undertaken after the urine has been rendered sterile. Failing this, the urethra should be disinfected before dilatation, although this was not responsible for the low incidence of bacteraemia in the present series. These measures are particularly important for patients with known valvular heart disease and for older patients with aortic ejection murmurs, the significance of which is often uncertain. The organisms causing urinary infection in these cases may be difficult to eliminate and, as suggested by Lloyd-Still (1965), blood cultures should be taken after genito-urinary procedures when valvular heart disease is known to be present.

No instance of bacteraemia occurred after prostatic massage performed to obtain specimens of prostatic fluid for examination. However, the prostatic fluid was not cultured because of the difficulty of obtaining the fluid without urethral contamination. For this reason bacteriological findings in prostatic fluid are of uncertain value. Ambrose and Taylor (1953) found various organisms in the prostatic fluid in nearly all of their cases of non-gonococcal urethritis and also in controls, whereas O'Shaughnessy, Parrino, and White (1956) rarely found them. Miller and others (1958) grew only a few colonies of *Staphylococcus albus* from cultures of fragments of prostate removed by resection.

Summary

Blood cultures were taken from 37 patients after dilatation of urethral strictures, from 39 patients after prostatic massage, and from 22 patients after anterior urethroscopy. A positive culture was obtained in one instance only, from a patient with urethral stricture and urinary infection; repeated dilatation consistently gave positive blood cultures in this case except when the urine had been temporarily rendered sterile. The bacteraemia was shown to be transient. Possible reasons for differences in the incidence of bacteraemia after dilatation of urethral strictures are discussed.

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La bactérémie qui suit les interventions génito-urinaires

RÉSUMÉ

Des prises de sang pour cultures ont été obtenues de 37 malades après dilatation des rétrécissements urétraux, de 39 malades après massage de la prostate, et de 22 malades après une urétroscopie antérieure. Une culture positive a été obtenue que dans un seul cas, c'est-à-dire d'un malade souffrant de rétrécissement urétral et d'infection urinaire; des dilatations répetées ont donné des cultures sanguines positives constantes excepté quand l'urine avait été rendue temporairement stérile. Il a été démontré que la bactérémie n'était que transitoire. Des raisons probables pour expliquer la différence du taux de la bactérémie après la dilatation des rétrécissements urétraux ont été discutées.